Claims

1. An electrically conductive hydroprimer for plastics, comprising

I) at least one component comprising

A) at least one aqueous polyurethane dispersion and

B) at least one electrically conductive pigment; and

II) at least one component comprising at least one polyisocyanate,

characterized in that at least one of the components I and II comprises at least one aromatic solvent (D).

2. The hydroprimer of claim 1, characterized in that it contains the aromatic solvent or solvents (D) in an amount of from 0.1 to 10% by weight, based on the total amount of the hydroprimer.

3. The hydroprimer of claim 1 or 2, characterized in that the aromatic solvent (D) is selected from the group consisting of mononuclear or polynuclear

aromatics or heteroaromatics which are unsubstituted or are mono-, di- or trisubstituted by alkyl, cycloalkyl, perhaloalkyl, perhalocycloalkyl alkyloxy, cycloalkoxy and/or perhaloalkyloxy groups, it also being possible for said groups to be linked cyclically to the aromatic nucleus or nuclei, and also mononuclear or polynuclear aromatics or heteroaromatics which are mono-, di- or trisubstituted by nitrile and/or nitro groups and/or halogen atoms.

4. The hydroprimer of any of claims 1 to 3, characterized in that mononuclear aromatics and/or heteroaromatics are used.

5. The hydroprimer of claim 3 or 4, characterized in that benzene, toluene, o-, m- and/or p-xylene, mesitylene, pseudocumene, hemellitene, ethylbenzene, cumene, p-cymene, tert-butylbenzene, chlorobenzene, o-, m- and/or p-dichlorobenzene, fluorobenzene, o-, m- and/or p-difluorobenzene, perfluorobenzene, nitrobenzene, benzonitrile, methoxybenzene, ethoxybenzene or thiophene is used.

6. The hydroprimer of any of claims 1 to 5, characterized in that the polyurethane dispersion (A) comprises at least one polyester-polyurethane (A) containing (potentially) cationic functional

groups (a11) or (potentially) anionic functional groups (a12) and/or nonionic functional groups (a13) on the basis of polyalkylene ethers.

7. The hydroprimer of claim 6, characterized in that the potentially cationic functional groups (a11) are primary, secondary or tertiary amino groups, secondary sulfide groups or tertiary phosphine groups, the cationic functional groups (a11) are secondary, tertiary or quaternary ammonium groups, tertiary sulfonium groups or quaternary phosphonium groups, the potentially anionic functional groups (a12) are carboxylic acid, sulfonic acid or phosphonic acid groups, and the anionic functional groups (a12) are carboxylate, sulfonate or phosphonate groups.

8. The hydroprimer of any of claims 1 to 7, characterized in that the polyester-polyurethane (A) is preparable by reacting

- polyesterpolyols and

- compounds which introduce the stabilizing (potentially) ionic groups (a11) or (a12) and/or the nonionic functional groups (a13), and if desired

- polyamines and

- amino alcohols

with polyisocyanates.

9. The hydroprimer of any of claims 1 to 7, characterized in that the polyesterpolyols are obtainable by reacting

- unsulfonated or sulfonated saturated and/or unsaturated polycarboxylic acids or their esterifiable derivatives, together if desired with monocarboxylic acids, and

- saturated and/or unsaturated polyols, together if desired with monools.

10. The hydroprimer of any of claims 1 to 9, characterized in that metal pigments, conductivity blacks, doped pearlescent pigments or conductive barium sulfate, especially conductivity blacks, are used as electrically conductive pigments (B).

11. The hydroprimer of any of claims 1 to 10, characterized in that it comprises electrically nonconductive pigments and/or coatings additives (C).

12. The hydroprimer of any of claims 1 to 11,

characterized in that it has a solids content of from 30 to 80% by weight, based on the hydroprimer.

13. Use of the hydroprimer of any of claims 1 to 12 for producing multicoat color and/or effect paint systems.

14. A process for producing multicoat color and/or effect paint systems on plastics parts by

1a) applying the hydroprimer of any of claims 1 to 12 and heat curing the resultant hydroprimer film to give the electrically conductive hydroprimer coating; or alternatively

1b) applying the hydroprimer of any of claims 1 to 12, drying the resultant electrically conductive hydroprimer film, applying a light-colored hydroprimer film, and jointly heat curing the resultant electrically conductive hydroprimer film and the light-colored hydroprimer film, to give the electrically conductive hydroprimer coat and the light-colored hydroprimer coat; and

2a) applying a solid-color topcoat material and heat curing the resultant solid-color topcoat

film to give a solid-color topcoat; or alternatively

2b) applying an aqueous basecoat material and partially drying the resultant aqueous basecoat film, and

3) applying a clearcoat material and subjecting the resultant clearcoat film and the aqueous basecoat film to a joint heat cure or a heat cure and a cure with actinic light, to give the basecoat and the clearcoat.

15. The process of claim 14, characterized in that

4) the clearcoat (3) is coated with a further clearcoat material and the resultant clearcoat film is cured by heat and/or actinic radiation to give a highly mar resistant clearcoat (sealer).

16. A multicoat color and/or effect paint system for plastics parts, which comprises the following coats atop one another in the stated sequence:

1a) an electrically conductive hydroprimer coating or alternatively

1a) an electrically conductive hydroprimer

coating and

1b) a light-colored hydroprimer coating, and

2a) a solid-color topcoat or alternatively

2b) a basecoat, and

3) a clearcoat.

17. The multicoat color and/or effect paint system of claim 16, characterized in that the clearcoat (3) has been coated with a sealer (4).

18. Plastics parts coated with at least one multicoat color and/or effect paint system of claim 16 or 17 and/or at least one multicoat color and/or effect paint system producible as in claim 14 or 15.

19. The use of the plastics parts of claim 18 for producing bodies for automobiles and for cabs of commercial vehicles.

20. An electrically conductive hydroprimer for plastics comprising

I) at least one component comprising

A) at least one aqueous polyurethane dispersion and

B) at least one electrically conductive pigment; and

II) at least one component comprising at least one polyisocyanate,

wherein at least one of the components I and II comprise at least one aromatic solvent.

21. The hydroprimer of claim 20, wherein the aromatic solvent is present in the hydroprimer in an amount from 0.1 to 10% by weight based on the total weight of the hydroprimer.

22. The hydroprimer of claim 20, wherein the aromatic solvent is selected from the group consisting of mononuclear aromatic, polynuclear aromatic, mononuclear heteroaromatic, and polynuclear heteroaromatic, wherein the aromatic solvent is unsubstituted or is mono-, di-, or tri-substituted by at least one of an alkyl group, a cycloalkyl group, a perhaloalkyl group, a perhalocycloalkyl alkyloxy group, a cycloalkoxy group, a perhaloalkyloxy group, a nitrile group, a nitro group, and a halogen atom, and optionally wherein the alkyl group, the cycloalkyl group, the perhaloalkyl group, the perhalocycloalkyl alkyloxy group, the cycloalkoxy group, and the perhaloalkyloxy group can be linked cyclically to the aromatic nucleus or nuclei.

23. The hydroprimer of claim 20, wherein the aromatic solvent is at least one of a mononuclear aromatic and a mononuclear heteroaromatic.

24. The hydroprimer of claim 20, wherein the aromatic solvent is selected from the group consisting of benzene, toluene, o-xylene, m-xylene, p-xylene, mesitylene, pseudocumene, hemellitene, ethylbenzene, cumene, p-cymene, tert-butylbenzene, chlorobenzene, o-dichlorobenzene, m-dichlorobenzene, p-dichlorobenzene, fluorobenzene, o- difluorobenzene, m-difluorobenzene, p-difluorobenzene, perfluorobenzene, nitrobenzene, benzonitrile, methoxybenzene, ethoxybenzene, thiophene, and mixtures thereof.

25. The hydroprimer of claim 20, wherein the polyurethane dispersion comprises at least one polyester-polyurethane containing at least one of a cationic functional group; a functional group that can be converted into a cation by at least one of a neutralizing agent and a quaternizing agent; an anionic functional group; a functional group that can be converted into an anion by a neutralizing agent; and a nonionic functional group based on a polyalkylene ether.

26. The hydroprimer of claim 25, wherein the functional group that can be converted into a cation is at least one of a primary amino group, a secondary amino group, a tertiary amino group, a secondary sulfide group, and a tertiary phosphine group; wherein the cationic functional group is at least one of a secondary ammonium group, a

tertiary ammonium group, a quaternary ammonium group, a tertiary sulfonium group, and a quaternary phosphonium group; wherein the functional group that can be converted into an anion is at least one of a carboxylic acid group, a sulfonic acid group, and a phosphonic acid group; and wherein the anionic functional group is at least one of a carboxylate group, a sulfonate group, and a phosphonate group.

27. The hydroprimer of claim 20, wherein the polyester-polyurethane comprises a reaction product of

i) a polyesterpolyol

ii) a compound that provides at least one of a cationic functional group; a functional group that can be converted into a cation by at least one of a neutralizing agent and a quaternizing agent; an anionic functional group; a functional group that can be converted into an anion by a neutralizing agent; and a nonionic functional group based on a polyalkylene ether, and

iii) a polyisocyanate, and

optionally at least one of a polyamine and an amino alcohol.

28. The hydroprimer of claim 20, wherein the polyesterpolyol comprises a reaction product of

i) at least one of a polycarboxylic acid and an esterifiable derivative of a polycarboxylic acid, and optionally further including a monocarboxylic acid,

wherein

i-a) the polycarboxylic acid is unsulfonated or sulfonated

i-b) the polycarboxylic acid is saturated or unsaturated,

i-c) the esterifiable derivative of a polycarboxylic acid is unsulfonated or sulfonated, and

i-d) the esterifiable derivative of a polycarboxylic acid is saturated or unsaturated,

and

ii) at least one of a saturated polyol and an unsaturated polyol and optionally further including a monool.

29. The hydroprimer of claim 20, wherein the electrically conductive pigment is selected from the group consisting of a metal pigment, a conductivity black pigment, a doped pearlescent pigment, a conductive barium sulfate, and mixtures thereof.

30. The hydroprimer of claim 20, wherein the hydroprimer further comprises at least one of an electrically nonconductive pigment and a coatings additive.

31. The hydroprimer of claim 20, wherein the hydroprimer has a solids content of from 30% to 80% by weight based on the weight of the hydroprimer.

32. A process comprising applying the hydroprimer of claim 20 to a substrate to produce a multicoat

paint system, wherein the paint system is one of a color paint system, an effect paint system, and a color and effect paint system.

33. A process for producing a multicoat paint system on a plastic part, wherein the paint system is one of a color paint system, an effect paint system, and a color and effect paint system, comprising

I) applying the hydroprimer of claim 20 to the plastic part to provide a hydroprimer film, and one of

Ia) heat curing the hydroprimer film to give an electrically conductive hydroprimer coating, or

Ib) drying the hydroprimer film, applying a light-colored hydroprimer film, and jointly heat curing the hydroprimer film and the light-colored hydroprimer film to give an electrically conductive hydroprimer coat and a light-colored hydroprimer coat; and

II) one of

IIa) applying a solid-color topcoat material to form a film and heat curing the solid-color topcoat film to give a solid-color topcoat, or

IIb) applying an aqueous basecoat material to form a film and partially drying the aqueous basecoat film, applying a clearcoat material, and curing the resultant clearcoat film and the aqueous basecoat film jointly to give a basecoat and a clearcoat, wherein the curing is one of i) heat curing or ii) heat curing

and a curing with actinic light.

34. The process of claim 33 further comprising coating the clearcoat with a further clearcoat material to form a further clearcoat film and curing the further clearcoat film to give a mar resistant clearcoat, wherein the curing is one of i) heat curing or ii) heat curing and a curing with actinic light.

35. The process of claim 33, wherein the plastic part is one of an automobile body and a commercial vehicle cab.

36. The process of claim 33, wherein at least one of:

A. the aromatic solvent is present in the hydroprimer in an amount from 0.1 to 10% by weight based on the total weight of the hydroprimer;

B. the aromatic solvent is selected from the group consisting of mononuclear aromatic, polynuclear aromatic, mononuclear heteroaromatic, and polynuclear heteroaromatic, wherein the aromatic solvent is unsubstituted or is mono-, di-, or tri-substituted by at least one of an alkyl group, a cycloalkyl group, a perhaloalkyl group, a perhalocycloalkyl alkyloxy group, a cycloalkoxy group, a perhaloalkyloxy group, a nitrile group, a nitro group, and a halogen atom, and optionally wherein the alkyl group, the cycloalkyl group, the perhaloalkyl group, the perhalocycloalkyl alkyloxy group, the cycloalkoxy group, and the perhaloalkyloxy

group can be linked cyclically to the aromatic nucleus or nuclei;

C. the aromatic solvent is at least one of a mononuclear aromatic and a mononuclear heteroaromatic;

D. the aromatic solvent is selected from the group consisting of benzene, toluene, o-xylene, m-xylene, p-xylene, mesitylene, pseudocumene, hemellitene, ethyl-benzene, cumene, p-cymene, tert-butylbenzene, chlorobenzene, o-dichlorobenzene, m-dichlorobenzene, p-dichlorobenzene, fluorobenzene, o- difluorobenzene, m-difluorobenzene, p-difluorobenzene, perfluorobenzene, nitrobenzene, benzonitrile, methoxybenzene, ethoxybenzene, thiophene, and mixtures thereof;

E. the polyurethane dispersion comprises at least one polyester-polyurethane containing at least one of a cationic functional group; a functional group that can be converted into a cation by at least one of a neutralizing agent and a quaternizing agent; an anionic functional group; a functional group that can be converted into an anion by a neutralizing agent; and a nonionic functional group based on a polyalkylene ether;

F. the polyester-polyurethane comprises a reaction product of

i) a polyesterpolyol

ii) a compound that provides at least one of a cationic functional group; a functional group that can be converted into a cation by at least one of a

neutralizing agent and a quaternizing agent; an anionic functional group; a functional group that can be converted into an anion by a neutralizing agent; and a nonionic functional group based on a polyalkylene ether, and

iii) a polyisocyanate, and

optionally at least one of a polyamine and an amino alcohol;

G. the polyesterpolyol comprises a reaction product of

i) at least one of a polycarboxylic acid and an esterifiable derivative of a polycarboxylic acid, and optionally further including a monocarboxylic acid, wherein

i-a) the polycarboxylic acid is unsulfonated or sulfonated

i-b) the polycarboxylic acid is saturated or unsaturated,

i-c) the esterifiable derivative of a polycarboxylic acid is unsulfonated or sulfonated, and

i-d) the esterifiable derivative of a polycarboxylic acid is saturated or unsaturated,

and

ii) at least one of a saturated polyol and an unsaturated polyol and optionally further including a monool;

H. the electrically conductive pigment is selected from the group consisting of a metal pigment, a conductivity black pigment, a doped pearlescent pigment, a conductive

barium sulfate, and mixtures thereof;

I. the hydroprimer further comprises at least one of an electrically nonconductive pigment and a coatings additive; and

J. the hydroprimer has a solids content of from 30% to 80% by weight based on the weight of the hydroprimer.

37. A multicoat paint system for a plastic part, wherein the paint system is one of a color paint system, an effect paint system, and a color and effect paint system, comprising the following coats atop one another in the stated sequence:

1) one of

1a) an electrically conductive hydroprimer coating, or

1b) an electrically conductive hydroprimer coating and a light-colored hydroprimer coating, and

2) one of

2a) a solid-color topcoat, or

2b) a basecoat and a clearcoat;

wherein the electrically conductive hydroprimer coating is the application product of the hydroprimer of claim 20.

38. The multicoat paint system of claim 37 further comprising a sealer atop the clearcoat.

39. The plastic part produced by the process of claim 33.

40. The plastic part produced by the process of claim 34.

41. A plastic part comprising the multicoat paint system of claim 37.

42. A plastic part comprising the multicoat paint system of claim 38.